

Claims

1. A solenoid valve, comprising:
 - a valve housing supporting a coil;
 - a ball in the valve housing;
 - a valve seat in the valve housing; and
 - a rod reciprocatingly disposed in the valve housing between a deenergized configuration, wherein the coil is deenergized and the ball is against the valve seat, and an energized configuration, wherein the coil is energized and the rod is urged against the ball to move the ball away from the valve seat, wherein the valve housing defines the valve seat and is made integrally with a winding bay, the coil being wound in the winding bay.
2. The valve of Claim 1, wherein the rod is distanced from the ball by between one tenth and eight-tenths of a millimeter (0.1mm-0.8mm) inclusive, when in the deenergized configuration.
3. The valve of Claim 1, wherein the valve housing is formed with at least one ball retainer rib defining a supply port having a first diameter, the ball being disposed between the rib and valve seat and defining a second diameter larger than the first diameter such that the rib retains the ball from passing outward through the supply port.

4. The valve of Claim 1, wherein the valve housing is formed with at least one supply port, the ball being disposed between the supply port and valve seat, the valve housing also defining a control port and an exhaust port, fluid communication being blocked through the supply port and established through the exhaust and control ports in the deenergized configuration, fluid communication being blocked through the exhaust port and established through the supply and control ports in the energized configuration.

5. The valve of Claim 1, further comprising a vehicle fluid system communicating with the valve.

6. The valve of Claim 1, further comprising a primary plate and at least one terminal, the housing being injection molded around the primary plate and terminal to form at least the valve seat and winding bay.

7. A solenoid valve for a vehicle, comprising:
a valve housing holding a rod, a ball, and forming a valve seat therebetween, the valve housing also defining a winding bay, a coil being wound in the winding bay.

8. The valve of Claim 7, wherein the valve housing is formed with at least one ball retainer rib defining a supply port having a first diameter, the

ball being disposed between the rib and valve seat and defining a second diameter larger than the first diameter such that the rib retains the ball from passing outward through the supply port.

9. The valve of Claim 7, wherein the valve housing is formed with at least one supply port, the ball being disposed between the supply port and valve seat, the valve housing also defining a control port and an exhaust port, fluid communication being blocked through the supply port and established through the exhaust and control ports in the deenergized configuration, fluid communication being blocked through the exhaust port and established through the supply and control ports in the energized configuration.

10. The valve of Claim 7, further comprising a vehicle fluid system communicating with the valve.

11. The valve of Claim 7, further comprising a primary plate and at least one terminal, the housing being injection molded around the primary plate and terminal to form at least the valve seat and winding bay.

12. A method for making a solenoid valve, comprising:
providing a metal primary plate and at least one terminal;

injection molding a valve housing around the primary plate and terminal such that the housing forms at least one valve seat and at least one winding bay;
disposing a coil in the bay in contact with the terminal.

13. The method of Claim 12, further comprising engaging a valve can with the primary plate.

14. The method of Claim 12, further comprising pressing at least one rod support bushing against the primary plate.

15. The method of Claim 14, further comprising slidably disposing a rod in the bushing.